

**The Evolution of Language Development with Premature Babies
and the Role of Speech Language Pathologists within the Neonatal Intensive Care Unit**

An Honors Thesis (HONR 499)

by

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Abstract

Within the United States, prematurity is one of the number one threats to newborn infants. Fortunately, there has been a significant increase in the types of medical technology available to this fragile population. Neonatal intensive care units (NICU) around the world have been able to dramatically increase the survival rates of these babies that are born as early as 22-23 weeks gestation. This is something that was totally unheard of as little as 15 years ago within the medical community.

The following information is to inform the reader about what classifies prematurity, the transformations that have occurred within NICUs around the country within the last few years, advice for new parents of premature infants, as well as identifying places to go for help and educational resources. This article also outlines the specific role that a speech language pathologist will play while working with this delicate population.

While many do not think that speech and communication is something to worry about at a young age, early intervention is crucial when working with this population. Providing a language rich environment from the very beginning is vital for the future academic success of these children. Babies are a special gift, and they deserve to have every opportunity open and available to them.

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Introduction

Of the 500,000 U.S. babies that are born each year, approximately 12.5% are born premature (Gunter, 2010). This means that premature birth is the leading cause of infant death worldwide (Gunter, 2010). While this is an extremely alarming number, the percentage of babies that survive a premature birth has dramatically increased. During the last ten years, there has been a significant increase in the types of technology used with babies who are born premature in hospitals around the world. Technology has dramatically increased the survival rate of this delicate population of children and has given them a greater chance at life. With state-of-the-art medical care, babies as young as 22 weeks and weighing about a pound have been able to survive (Smith & Elliot, 2011). Babies that had no chance of surviving approximately ten to fifteen years ago, now have a chance at life.

As a result of this increase in survival of young children, speech language pathologists, along with other professionals, have a duty and obligation to provide these babies and their families with the resources necessary to help the children develop. Without help, these babies will likely fall behind socially, developmentally, cognitively, physically and linguistically. Premature babies are also at a severely high risk of cerebral palsy, learning disorders and other anomalies (Smith & Elliot, 2011). However, if given the proper tools and intervention strategies, premature infants will have a better chance of not falling behind when compared to full term babies.

The Typically Developing Zygote

To fully understand prematurity, it is necessary to understand what happens in terms of development throughout the 40 week gestation period. The development of the child can be

broken down into two major phases: the *germinal* phase and the *gestational* phase. These two stages are crucial in order for the baby to develop all of its vital organs and organ systems necessary for life.

Germinal Phase

Before a woman gives birth to her baby, there are several critically important events that must take place in order for the baby to complete its full 40 week term in the womb. First, the sperm (from the male) and egg (from the female) must combine in order to form a *zygote*. At this point, fertilization has occurred and the single cell begins to divide into two separate masses. The inner cells of these masses will develop into the baby while the outer cells will develop into the placenta (protective “shell” for the baby). This stage typically lasts for approximately two weeks and is known as the germinal phase of pregnancy (Smith & Elliot, 2011).

Gestational Phase

The time from conception of the child until birth is referred to as *gestation*. After the zygote is formed, the baby begins to grow extremely quickly. Beginning in the third week of conception, the mass of cells begins to differentiate into different systems of the human body and the zygote is now called an *embryo*. Between weeks three and eight, the embryo will begin to form all of the structures necessary for the baby to live independently outside of the mother’s womb. This period of time is extremely important for the embryo, therefore it is crucial that the mother tries to live as healthy as possible and avoid toxins that could interfere with the development process (Smith & Elliot, 2011). Scientists classify the development of early structures into three layers:

Ectoderm: This layer will form into the skin, hair, parts of the eyes, ears and the nervous system.

Endoderm: This layer will form into the digestive system, respiratory system and glandular system.

Mesoderm: This layer will form into the muscles, bones, circulatory system and sex organs.

After nine weeks of pregnancy, the embryo then becomes a *fetus*. By the end of the third month, the fetus forms sexual organs, the mother can begin to feel movement and the fetus begins to exhibit sensitivity to lights and sounds from the external environment. This is a crucial time for the young fetus because it is trying to learn how to survive outside of its mother's body. These last few months of pregnancy are especially important to the fetus. "Every single day that the baby remains in the womb enhances the health of the fetus and its ability to survive (Smith & Elliot, 2011)".

(Table 1) The following table provides a general guideline for the development of the child in the womb during pregnancy:

DEVELOPMENT DURING PREGNANCY	
STAGE	DEVELOPMENT
First trimester	Fertilization, rapid cell division, and implantation occur. Cells differentiate into internal and external organs. Towards the end of this stage, the fetus looks like a tiny human.
Second trimester	More rapid growth occurs. The mother begins to feel the baby's movements. The baby develops regular sleep and wake cycles. The baby may be able to live independently by the end of this trimester.
Third Trimester	The baby prepares for birth by adding fat for temperature control, and its lungs develop further. The baby acquires immunity from the mother. Typically, the baby grows to between 5.5 and 9 pounds.

TABLE 1: From Smith and Elliot, 2011

It is important to realize that each of these stages is crucial in order for the baby's brain to properly develop. "Research shows that early childhood is marked by critical periods- times

when the brain is intensely adaptable to new sights, sounds, tastes, and touches” (Carr, 2014). At this point in development, the baby’s brain is undergoing millions of changes that could permanently alter the child’s future level of functioning. These changes occur due to a unique feature of the human brain known as synaptic plasticity. When the newborn leaves the womb, they are simply bombarded with sensory information. The brain begins to rapidly work at sorting out the relevant information from the environment from the irrelevant details in order to make sense of the world. “It does so by forming new connections (or strengthening existing ones) between some cells and pruning the connections between others” (Carr, 2014).

Increased plasticity of the brain is the most significant factor of the critical period of development. This is because as the brain ages, it “becomes less ‘plastic’, or easily modifiable, marking the closure of the critical period” of development (Carr, 2014). As a result, it is important for babies to make the necessary connections in the brain in order to grow developmentally, socially and cognitively. These early connections that are formed about basic factors of the child’s environment will help guide his opinions and knowledge of the outside world as he/she continues to grow and develop.

Danger Signs

Sadly, there are things that can go wrong while a woman is pregnant that prevents the fetus from making it to full term or that can cause health problems to the mother. Some of the most common concerns that expecting mothers need to watch for are preterm labor, gestational diabetes and pre-eclampsia (Smith & Elliot, 2011).

Preterm Labor

Preterm labor occurs when the mother begins to experience contractions and dilations of the cervix before 37 weeks of pregnancy. “The cervix is the lower portion of the uterus that closes to keep the fetus in the uterus until birth; it dilates, or widens, to allow the baby to be born” (Smith & Elliot, 2011).

Women who smoke, have high blood-pressure, gum disease, infections, diabetes, overweight, stressed, carrying multiple fetuses, or who drink alcohol are at higher risk of going into preterm labor. According to Smith and Elliot, it is important for women to take the following preventative measures in order to reduce the likelihood of preterm labor:

- Keep hydrated
- Avoid smoking, alcohol, and nonprescription drugs
- Keep regular doctor appointments
- Manage high blood pressure
- Check and maintain diabetes
- Take care of teeth
- Limit caffeine

Gestational Diabetes

Gestational diabetes can occur when a woman develops an insulin resistance during pregnancy that causes a rise in blood-sugar levels. These increased blood-sugar levels pose a health risk to both the infant and the mother. Babies born to women with gestational diabetes are often overweight, have low blood sugar or are jaundice. They also can have great difficulty with feeding problems. This is because when a baby is born overweight they tend to be sleepy and extremely lethargic. It is often difficult to get them to eat enough calories to sustain them throughout the day.

Typically, gestational diabetes forms around the 20th week of pregnancy and goes away after the birth of the child (Smith & Elliot, 2011). There are a few preventative measures a woman can take while pregnant in order to decrease the risk of developing gestational diabetes:

- Eat a healthy diet (high in fruits and vegetables)
- Exercise daily
- Monitor blood-sugar levels
- Take medication to lower blood-sugar if necessary

Pre-eclampsia

Pre-eclampsia is characterized by: high blood pressure, excess protein in the urine, headaches, blurred vision, abdominal pain, nausea, dizziness, swelling and decreased urine output (Smith & Elliot, 2011). This condition effects about 5-10% of all pregnant women and can range from moderate to severe cases.

Pre-eclampsia is extremely harmful to the fetus for several reasons. One of the major concerns is that it causes a decrease in the amount of blood flow to the placenta. The reduced blood flow can cause the placenta to separate from the uterine wall, have an increased amount of liver enzymes, and cause seizures and or cardiovascular damage (Smith & Elliot, 2011). There is not a cure for pre-eclampsia and research shows that delivering the baby is the only way to make the symptoms go away. However, some research suggests that taking a vitamin D supplement may help.

Research shows that women are at a high risk for pre-eclampsia if they:

- Have a personal or family history of the disorder
- Are pregnant for the first time or by a different man than previously
- Are carrying two or more babies
- Have diabetes

- Are obese
- Are younger than 20 or older than 40
- Have a history of asthma, high blood pressure, migraines, kidney disease or lupus
- Became pregnant many years after a previous pregnancy

Premature Infants

Premature infants are classified as those who are born before they have had the opportunity to fully develop (before the 37th week of pregnancy). Today, between 11 and 13 percent of all 500,000 babies born each year are premature (Smith & Elliot, 2011). It is important that these babies have multiple professionals working with them from the moment they are conceived in order to insure the best possible chances of survival. Professionals such as speech pathologists, audiologists, physical therapists, occupational therapists, psychologists, nurses and doctors play crucial roles in helping these little miracles survive.

There are several reasons why premature births occur; however, some instances of premature births are simply unknown. According to Smith and Elliot (2011), the following are some of the reasons why a woman may deliver prematurely:

- Teenage pregnancy
- More than two fetuses
- Previous delivery of a preterm baby
- Poor prenatal care
- Premature rupture of membranes surrounding the fetus
- Poor nutrition
- Stress
- Use of drugs or alcohol
- Maternal Infections
- Diabetes
- High blood pressure
- Hormone imbalances
- Structural abnormalities in mother
- Chromosomal abnormalities
- Age of mother at time of pregnancy (older the mother; the higher the risk)

When babies are born premature, they are not ready to deal with life outside of their mother's womb. The health and chance of survival for each baby that is born premature varies depending on the development of their lungs and other organs, their weight, their gestational age, genetics and the overall health of the mother.

While the complications that can occur with a premature birth differ from case to case, doctors have put together information based off of thousands of premature births to give parents an idea of what to expect. "The most significant factor in predicting the outcome for each baby is gestational age, meaning how far along in the pregnancy the mother is at the time of delivery" (Gunter, 2010). Gestational age is calculated from the first date of the last menstrual period or by an ultrasound that is done between eight and thirteen weeks. According to Jennifer Gunter (2010), premature babies are divided into four groups:

1. **Late preterm, 34-36 weeks.** Approximately 70% of babies are in this group. Major complications are rare. The most common issues are transient breathing problems, the buildup of a toxin in the blood called bilirubin (jaundice), and insufficient weight gain. Some late preterm babies will go to a regular nursery with full-term babies, but others will need observation or treatment in an intensive care setting.
2. **Moderately preterm, 32-33 weeks.** These babies need close monitoring of oxygen levels, heart rate, body temperature and blood pressure. Many will need oxygen for breathing, and most will be fed with a feeding tube. Major complications are rare (but can happen). The biggest complications to watch for are lung problems, infection, weight gain, feeding, jaundice, and nervous system development.
3. **Very preterm, 28-31 weeks.** Babies born before 32 weeks will need intensive care. Many will need oxygen or special equipment to breathe. They are at risk for problems involving the lungs, nervous system, gastrointestinal tract, vision, infection, feeding, weight gain and jaundice.
4. **Extremely preterm, less than 28 weeks.** Babies require special care for nearly every bodily function. Each week of prematurity greatly impacts the change of survival and risk of disability of the child.

Outcomes for Extremely Preterm Babies			
Gestational Age	Survival	% of Severe Disability	% of Minor Disability
Full Term	>99%	1%	8%
34-36 weeks	>99%	4%	15%
32-33 weeks	>98%	8%	15%
28-31 weeks	95%	12%	25%
27-27.6 weeks	90%	25%	25%
26-26.6 weeks	85%	25%	25%
25-25.6 weeks	60-75%	30%	30%
24-24.6 weeks	26-60%	>30%	>30%
23-23.6 weeks	8-33%	>30%	>30%
22-22.6 weeks	<20%	Insufficient medical studies to provide numbers, very few survive	

TABLE 2: From Gunter, 2010

What is the NICU

NICU is a term that stands for neonatal intensive care unit. This is a special area of a hospital that is designated for babies who have been born premature and their families. These babies require constant monitoring and advanced medical technology in order to survive. The purpose of the NICU is to provide care to the delicate newborns and offer parents support for caring for their new baby once they are able to leave the hospital. Some of the areas that the NICU will monitor in young premature babies include (but are not limited to):

- **Breathing:** When a baby is born too early, they will most likely not have fully developed lungs. Respiratory distress syndrome (RDS) is caused because babies' lungs are not able to fully expand to take in oxygen (Smith & Elliot, 2011). This condition must be closely monitored and treated with both medication and mechanical assistance.

RDS is typically caused due to a lack of a slippery substance on the lining of the lungs known as surfactant. "This substance helps the lungs fill with air and keeps the air sacs from deflating" (Lee, 2014). Surfactant is present in babies at birth, but only after the lungs have been fully developed. Most cases of RDS occur in babies who are born prior to 37 weeks gestation.

- **Jaundice (Hyperbilirubinemia):** This is a common condition that occurs when there is too much bilirubin in the baby's blood. Bilirubin is a chemical that is normally processed and eliminated from the body by the liver; however, some babies' bodies do not have the ability to filter this chemical out on their own (Smith & Elliot, 2011). Jaundice will cause the baby to have a yellow skin tone. The baby will be placed under special lights (known as an incubator) to help the body eliminate the excess bilirubin from the system.

Severe cases of hyperbilirubinemia can lead to oxygen deficiencies within the young infant (hypoxia). This is extremely dangerous because the baby's brain needs a steady supply of oxygen in order to make the necessary connections as previously discussed. If the brain is being deprived of oxygen, the neural pathways will be destroyed and placid brain of the baby will quickly begin to lose the ability to shape and prune the information it is receiving from the environment (Lee, 2014).

- **Warmth:** Due to the fact that many premature babies weigh less than 5 pounds, they do not have enough body fat to keep them warm. In the NICU, nurses will place the babies in incubators or under warmers to help keep their body temperatures normal. "Some NICUs even encourage placing the babies on their parent's chest to help them keep warm. This practice likely promotes critical bonding between infant and parents as well" (Smith & Elliot, 2011).

The ability to maintain a constant body temperature is one of the important abilities a baby must have in order to reach a state of physiological homeostasis. This term can be defined as "the maintenance of a relatively stable internal physiological conditions (as body temperature or the pH of blood) in higher animals under fluctuating conditions" (Merriam-Webster Dictionary, 2014). A baby needs to achieve homeostasis in order to be able to survive outside of the mother's womb. Unfortunately for newborns this can be quite difficult because many times their neurological systems are not fully intact. As a result, they need the help of incubators to maintain a steady body temperature until their brain is able to fully develop.

- **Weight:** Having the babies gain weight is one of the most important goals of the NICU with their premature babies. Since many of them do not have the muscle strength or the respiratory stability to eat orally, they are normally fed intravenously (through a tube leading directly to their stomachs). "Breast milk,

pumped from the mother and fortified with extra calories, vitamins, and minerals, can be fed through the tube in order to help the baby increase in weight more rapidly” (Smith & Elliot, 2011).

- **Other Conditions:** NICUs also have the important task of monitoring the baby’s heart, brain, blood vessels in eyes and for signs of infections that could severely decrease the baby’s chance for survival.

The Neonatal Intensive Care Unit (NICU)

The NICU has not always been a place full of state of the art technology and rich learning environments for young babies who are required to have an extended stay at the hospital. These floors used to be white, quiet and sterile environments that did very little to stimulate language and brain growth in these young children. In order to develop, babies need “a developmentally appropriate environment with extensive individualized care” (Hendricks, Prendergast, Caprio and Wasserman, 2002). In the 1960’s and 1970’s, premature babies were simply not getting the intensive specialized care that they deserved. Thankfully, NICUs have significantly changed in recent years.

Based on years of research, it is evident that the NICU of the 1980s is simply not going to cut it for premature infants. The white, sterile environments of the past did little to help these babies form the connections in the brain that are necessary for proper cognitive development. “In an environment rich in all sorts of learning experiences, the growth of synapses- the connections between nerve cells in the brain that rely on this information- is more lush, and this complex circuitry enlarges brain capacity. Infants who are not held and touched, whose playfulness and curiosity are not encouraged, form fewer of these critical

connections” (Bruer, 1999). Something had to change in order for babies who were born premature in the hospital had a greater chance at success not only in school, but later on in life.

One of the most significant changes that increased premature birth survival rates within occurred in the 1980s with the development of surfactant therapy (March of Dimes Foundation, 2014). As previously discussed, surfactant is a substance that lines the inside of the alveolar surfaces of the lungs. This coating helps to reduce the surface tension of the lungs which allows our lungs to be able to take in the necessary amount of oxygen to survive. Sadly, babies that are born premature do not have this coating within their lungs. Therefore, they have significant difficulty taking in enough oxygen to survive.

Prior to 1980, many babies that were born premature would die due to the fact that they simply could not breathe. Even though they were hooked up to breathing machines, they could not get enough oxygen into their lungs due to a lack of surfactant. The development of surfactant therapy has significantly increased the amount of premature babies who are surviving (Pediatrics and Child Health, 2005).

Another reason why more babies are surviving today is as a result of the development of multiple types of nurseries where babies can go based on their specific needs. The care for the infants is personalized and the child has the opportunity to get one-on-one care if needed. These nurseries are ranked based upon the type of care they will provide for the child. The first type of nursery is called a **level one** (or newborn) **nursery**. This is a nursery for healthy babies who are able to maintain their body temperature and do not require special monitoring, oxygen or IVs. Most of the time, babies who are born between 35 and 37 weeks (or more) will be able to go to this type of nursery (Gunter, 2010).



The next nursery is called a **level two nursery**. This is a neonatal intensive care unit (NICU) that offers advanced medical and nursing care to babies who are older than 32 weeks gestation. Babies who are placed in level two nurseries are able to receive oxygen, be fed by a tube and take medications through an IV (Gunter, 2010).

Finally, a **level three nursery** is a special kind of NICU that is equipped to care for the sickest and smallest newborn babies. Typically, babies who are less than 32 weeks gestation and who need to be placed on a ventilator to breathe are cared for in this type of nursery (Gunter, 2010).

Another factor that has significantly improved the survival rate of babies who are born premature is a shift in the model of care that many NICUs are using within hospitals. In recent years, many hospitals began shifting to what is known as a developmental care model. One example of a developmental care model is known as Newborn Individualized Developmental Care Plan (NIDCAP). "This model provides education and specific training for individual health professionals with the goal of an altered developmental approach of care in the NICU and the Special Care Nursery" (Hendricks, Prendergast, Caprio and Wasserman, 2002). This program trains selected individuals to observe the infants' strengths and needs in the areas of sleep/wake states, physiologic and motor organization as well as reactivity to environmental and social stressors (Hendricks, Prendergast, Caprio and Wasserman, 2002). Due to the fact that the babies are beginning to receive a more personalized care plan, their chances of survival have significantly increased.

Stimulating Premature Babies



It is important that parents and caregivers start stimulating their young baby's mind for language from the moment they leave the womb. Some experts say that reading to your child (even before they are born) teaches them valuable lessons about how language works and the different sounds that go together to form meaningful conversation (Hendricks, Prendergast, Caprio and Wasserman, 2002). When babies are born premature, they are often required to stay in the hospital for an extended amount of time. Years ago, this was absolutely devastating to a child's language development because they were forced to lie in sterile hospital rooms hooked up to countless machines for hours at a time.

Extended hospital stays caused many premature children to form a language delay that affected their ability to read, their language comprehension, their ability to articulate speech sounds, as well as their writing ability (Adelizzi and Goss, 2001). This type of environment is simply detrimental for the development of the young mind. As a result, researches and medical professionals decided to do something about the lack of stimulation. Neonatal intensive care units became places that were great for learning as well as for the recovery process.

Problem Areas for Premature Babies

After leaving the NICU, premature babies are still at risk for several other problems as they continue to develop. It is important to realize that the outcomes of babies who are born early vary from no deficits at all to major physical and cognitive delays. Typically, the earlier the baby is born, the greater the risk they have for developing serious delays and disorders. However, the longer the baby is able to stay in the womb; it is more likely that the delays will be less severe. The following are areas of concern for babies who are born premature:

- **Chronic lung disease:** When babies' lungs are not fully developed, they will likely have continued problems such as asthma as they get older. However, some people can grow out of this as they age.
- **Vision and hearing problems:** Sometimes, babies born prematurely can suffer from abnormal growths of blood vessels in the eyes. These abnormal growths can cause severe damage and require the child to have to wear glasses later in life or, in the most severe cases, go completely blind. Other common problems include strabismus (lazy eye) and hearing problems.
- **Cerebral Palsy:** This is a condition that causes damage to the brain in the area that controls body movements and muscle control (Smith & Elliot, 2011). This can be caused by bleeding of the brain or lack of oxygen to the brain. The severity of cerebral palsy varies to mild and nearly undetectable to severely disabling.
- **Learning Delays:** Children born early are at greater risk for learning problems and attentional-deficit disorders.

What Can Parents of Premature Babies Do

Bringing a baby, especially a premature baby, home from the hospital can be frightening and quite exhausting to new parents. "Changes in healthcare have placed hospitals under increasing financial pressure to discharge babies-even babies with complex medical requirements-as quickly as possible" (Tracy and Maroney, 1999). As a result of these medical requirements, parents are forced to become more than mothers and fathers to their newborn; they are responsible for being nurses, doctors, therapists and educators as well.

There are several things that parents of young premature babies can do to help kick-start their child's growth and development from birth through the high school years and beyond. One of the most crucial things a parent of a young newborn can do is to make eye-contact with their child. The parents are the center of every newborn's world and the baby wants to connect with their caregiver. Studies have shown that babies prefer to look at faces

more than any other picture or pattern that they see in the world around them (Halsey, 2012). Watching human faces is a wonderful learning experience for infants because this is how they are going to learn about how to form the meaningful sounds of language. “Within hours of birth, your baby will be able to copy the movements of your face. While he is in the baby carrier or in your arms, let him see your face, then wait and watch while he tries to mimic you” (Halsey, 2012). It is absolutely amazing to see what a little one can do simply by given visual cue from the parents/caregivers.

While it may seem obvious, talking to your baby from the very beginning is another crucial for language development. “When you sing, talk, touch, look, at and read to your baby you are helping them to: understand the patterns and tones of speech, learn to listen and respond, use touch to gain attention, practice coping, gain vocabulary and to simply learn to enjoy communicating (Halsey, 2012). During this period of development, the newborn baby is making hundreds of thousands of brain connections about his/her environment each and every day. It is important for parents to talk about everything they see and everything they do with their baby. Trips in the car, going to the grocery or even simply going on a walk are prime opportunities for parents to talk to their babies about their environment.

Another beneficial thing that a parent of a young baby can do is to give them loving massages. Research has found that this is one of the best ways to form a strong parent-baby connection within the first few months after birth. Massages help to calm the baby and make him feel safe and secure. The following massage techniques can be used by parents and caregivers in order to help stimulate the baby, help them sleep better and to help them gain relief from gas or colic (Halsey, 2012):

1. **Gently stroke your baby's face and head.** Run your fingertips over her forehead, cheeks, and lips and then stroke your fingertips from the sides of her nose out across her cheeks.
2. **Cup your hands over the baby's shoulders.** Gently stroke her upper back and over her shoulders. Use circling movements and a gentle sweeping action.
3. **Gently rub baby's chest and abdomen with palm.** Move your hand in a clockwise, then counterclockwise direction. If she shows any signs of discomfort, stop massaging.
4. **Hold your baby's hand** and gently straighten her arm. Use your other hand to stroke up and down her arm, using a soft "milking" action as you go. Repeat on the other arm.
5. **Take your baby's hand** and give her palm a soothing stroke. Use a circling motion to work around each palm in turn, moving from the edges to the center.
6. **Take each finger in turn** and, with your thumb and forefinger, gently unfold the finger and then stroke it from the bottom to the fingertip. Finish with the thumb and repeat on other hand.
7. **Support your baby's ankle** in one hand, lift her leg slightly, and use your other hand to massage the leg from top to bottom. Lie down gently and then take the other leg and repeat.
8. **Finish off with your baby's feet.** Hold her foot in your hand and massage the entire foot, working in circles over the sole and then gently pulling each toe. Repeat on other foot.

While stimulating your young child is crucial, it is also very important that they are not *overstimulated*. Too much sensory input can cause the baby to feel confused, stressed and overwhelmed. Simply having quiet time with your baby helps both the parent as well as the child develop a partnership with one another. When you and your baby share quiet times you are helping her to: get to know you, build social skills, share experiences and to feel safe to look and listen. Each of these skills is crucial for young babies as they begin to learn about their environment.



As the child continues to grow and develop, the role of the parent does not stop. Many times babies who are born premature may struggle as they get into their school aged years. The areas of reading, spelling, writing and language can sometimes be a challenge for this population of students. Parents can help their children be successful and guide their learning at home in several ways. The following are suggestions from Adelizzi and Goss (2010):

1. Give unconditional acceptance
2. Acknowledge child's feelings
3. Emphasize competence
4. Know personal limits
5. Let child do things for themselves
6. Do not overload the child
7. Teach time management strategies
8. Give child a special learning space
9. Provide materials that facilitate success
10. Monitor their homework/studying
11. Take preventive measures

Role of the Speech Language Pathologist

The importance of language in human communication is vital and cannot be overestimated. In our world today, there are several ways in which we communicate with others such as music, images, scents, gestures, speaking and writing. "We even use our intuitions to read between the lines and to understand things not transmitted through sensory data. We perceive and interpret the flashing red traffic light, the screech of a tea kettle's whistle, the pungent odor that tells us our dog has tangled with a skunk, the touch of our child's hand in our seeking reassurance" (Adelizzi and Goss, 2010). Language is all around us, and the ability to understand each of the different sounds we hear is crucial for our social and educational success.

From the moment a child is born, they begin to hear sounds that will one day make sense to him/her. “Humans are born with brain structures and neurological wiring that allow them to acquire and use language. But it is only through our interactions with the environment that cause the connections to be made in the brain to turn on the amazing capacities we have for language. Nature and nurture have to go hand in hand for language to develop” (Adelizzi and Goss, 2010).

This is where the speech language pathologist (SLP) comes into play. While many may not think that a speech pathologist is important on the floor of a NICU, their job should not be underestimated. Speech pathologists have the crucial role of working with parents from the very beginning to teach them how to stimulate their young child’s mind for the acquisition of language. Parents need to know how children typically develop language so that they can watch their child for developmental delays as a result of being born premature. Even though the child cannot yet speak, there are several things the parents should do in order to help their child stay caught up in terms of reading, writing and language.

Another important role of the speech pathologist in the NICU is to monitor the grooves in the palate and the dental arch of the young baby. Sometimes, premature infants have to be intubated in order to receive oxygen and other nutrients that are vital for survival. When this occurs, the baby can develop a narrow groove in the palate (the roof of the mouth) and the dental arch (where the teeth erupt). This groove on the palate and/or the dental arch that can form may result in overcrowding of the teeth, affect jaw alignment and even inhibit proper speech (Tracy and Maroney, 1999). In this case, a pediatric speech language pathologist should be contacted in order to be proactive in working with the child.

Speech language pathologists must also teach parents about the communication development of preterm infants as compared to full-term infants. Full-term infants typically begin communicating through the use of crying, cooing, and squealing. Around four months, the cries and squeals turn into babbling. By around nine months to one year of age the child will begin to say their first words such as “mama” or “dada”.

Premature infants typically reach these communication milestones later than what full-term infants do. “Medical problems such as respiratory difficulties, can affect the start of early speech and language skills. Feeding disorders and oral defensiveness can also hinder speech development” in premature infants (Tracey and Maroney, 1999). Other potential causes of communications delays include extended hospitalization, the presence of a tracheostomy and hearing loss.

Speech language pathologists will work with individuals who exhibit the following speech delays that are associated with premature birth (Tracey and Maroney, 1999):

Voice Problems: Preemies with voice problems were likely intubated for a long amount of time. Their voices can be high-pitched, hoarse, harsh-sounding or even sound as quiet as a whisper.

Dysfluency (stuttering): Stuttering typically occurs when young children learn more words than what their motor abilities allow them to say. However, parents need to watch for signs of tension in the face, neck and/or shoulders because this can be a sign of a more serious problem.

Deficit in Comprehension: Children who struggle with comprehension may not answer questions that they are asked appropriately. They may also have difficulty understanding word or sentence meanings. (ex: “What is your name?” the child responds “three” for her age.)

Delayed sound production: Some preemies are slightly slower at producing recognizable sounds and are then slower to produce their first words.

Delayed use of words: Sometimes, the child’s vocabulary does not match their age or their level of language understanding (receptive language is much stronger than expressive language). The child’s sentences and use of grammar may also fall below peers.

Places to go for Help

Raising a premature infant can be scary, overwhelming and exhausting for first time parents. However, it is important to remember that you do not have to go through this difficult time alone. There are several wonderful groups and organizations that provide educational support and resources for parents and other family members who are learning how to care for their new baby.

One of the most influential groups in the United States that is known for providing support for families who have premature babies is called March of Dimes. This wonderful organization was founded by Franklin D. Roosevelt in 1938 in order to help fight polio. He developed this group after his own personal struggle with polio as a way to raise awareness and to support others who had been affected by this terrible illness. “The foundation eventually established a polio patient aid program and funded research for vaccines developed by Jonas Salk, MD and Albert Sabin, MD. These vaccines effectively ended epidemic polio in the United States” (March of Dimes, 2014).

As the organization grew, it began to shift its focus to premature birth and birth defects. Research that has been done by countless members in this organization has helped in saving the lives of thousands of babies worldwide. “The March of Dimes has led the way to discover the genetic cause of birth defects, to promote newborn screening, and to educate medical professionals and the public about best practices for healthy pregnancy” (March of Dimes, 2014). This is an excellent foundation that parents can turn to in order to get the answers that they are looking for about their newborn.

Another place where parents can go for help here in Indiana is known as First Steps. This is an early intervention program for infants and toddlers who have any sort of special need that may affect typical growth and development. The goal of this system is to “assure that all Indiana families with infants and toddlers experiencing developmental delays or disabilities have access to early intervention services close to home when they need them” (First Steps, 2014). There are sixteen different services that are provided by this government funded group that are able to help children from the ages of birth to three years of age. The following are some of the services provided to families (according to the First Steps website):

Assistive Technology (AT) devices include a variety of items, equipment, materials or services, used with individual children to improve their functional abilities. This may also include the adaptation to toys and learning materials within the home that permit the child to be more successful throughout their daily activities.

Audiological Services including signed and cued language, can identify if the child has a hearing loss, how significant the loss may be and what the loss means in terms of the child’s ability to communicate and develop.

Developmental Therapy

Family Education, training, counseling and home visits are provided to assist the family in understanding the need of their child.

Health Services this includes intermittent catheterization or tracheotomy care or helping the child’s physician work with other early intervention providers concerning the special health needs of the child.

Medical Services for diagnostic purposes are only for evaluation purposes to determine the developmental status of the child, when eligibility cannot otherwise be determined.

Nursing Services may include assessment of health status, provision of care to prevent health problems, restore or improve functioning, and promote optimal health and development of the child.

Nutrition Services include assessment and development of a nutrition plan that is individualized and (if necessary) involves referral of child to appropriate community resources.

Physical Therapy focusing on gross motor skills and the ability to use/effectively move his/her arms, trunk, legs and head.

Psychological Services including administration of psychological/developmental assessments, planning and managing a program of psychological services that may include counseling the child and family, and providing parent training/educational programs specific to their child’s needs

Speech Therapy focuses on receptive (understanding what is said) and expressive (responding to others) language. It may include the use of sign language, augmentative communication devices or other assistive technology. The speech pathologist may also help with the child's feeding program.

Conclusion

The impact of research and technology within the field of premature births has dramatically increased the survival of premature infants around the globe. With the rising survival rate of this population, it is important to note that medical professionals such as physical therapists, speech pathologists and child audiologists are in great demand. Professionals must do everything in their power to help assist these babies and their families during this exciting yet scary time of development.

Providing resources such as educational workshops, support groups and the highest quality of medical care is of the utmost importance in order to help ensure the success of this fragile population. We must fight in order to give these babies and their families a chance at normal growth and development.

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